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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,863	03/05/2002	Eddie Kai Ho Ng	78945-35/jlo	8357

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EXAMINER	
FUREMAN, JARED	
ART UNIT	**PAPER NUMBER**
2876	

DATE MAILED: 03/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/087,863	NG, EDDIE KAI HO	
	Examiner	Art Unit	
	Jared J. Fureman	2876	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-42 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-8,11,13-15,18-30,33-35 and 37-42 is/are rejected.

7)☒ Claim(s) 9,10,12,16,17,31,32 and 36 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 05 March 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 4/22/2002.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Receipt is acknowledged of the IDS, filed on 4/22/2002, which has been entered in the file. Claims 1-42 are pending.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-7, 14, 18-21, 23-30, 37-40, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakabayashi et al (US 6,597,830 B1) in view of Brzozowski et al ("Optical Signal Processing Using Nonlinear Distributed Feedback Structures", cited by applicant).

Nakabayashi et al teaches an apparatus and method for equalizing channel powers of a multichannel optical signal comprising: an optical demultiplexer (212) for demultiplexing the multichannel optical signal into a plurality of single channel optical signals, for each single channel optical signal a respective optical limiter (level controller 215) which is adapted to limit the single channel optical signal to produce a limited single channel optical signal; and an optical multiplexer (218) for multiplexing the limited single channel optical signals to produce an equalized multichannel optical signal; wherein each nonlinear optical limiter has a limit transmission power such that the limited single channel optical signal is limited to a power less than or equal to the limit transmission power (in the case where the level controller attenuates the signal);

wherein the limit transmission powers of the nonlinear optical limiters are equal; an amplifier for amplifying the multichannel optical signal; an amplifier (211) for amplifying the multichannel optical signal (see figure 8, and column 8 line 66 - column 10 line 37).

Nakabayashi et al fails to specifically teach the optical limiter being a nonlinear optical limiter; wherein each nonlinear optical limiter is adapted to produce a limited single channel optical signal according to an optical limiting power transfer curve applied to the respective single channel optical signal, said optical limiting power transfer curve providing a piecewise increasing monotonic transmitted power function portion when incident light upon the nonlinear optical limiter has a power less than an incident light critical power, and providing a relatively flat transmitted power function portion when incident light upon the nonlinear optical limiter has a power greater than the incident light critical power, and wherein the limit transmission powers of the nonlinear optical limiters are defined by said relatively flat transmitted power function portion; wherein the piecewise increasing monotonic transmitted power function portion has a steeper transmitted power function portion having a slope of greater than one whereby sides of optical pulses of the respective single channel optical signal are corrected; the piecewise increasing monotonic transmitted power function portion has a transmitted power function portion which limits the power of the respective single channel optical signal to an insignificant transmission power for incident light upon the nonlinear optical limiter having a power less than an incident light power threshold, wherein the incident light power threshold is less than said incident light critical power; wherein the nonlinear optical limiters are Bragg gratings comprising nonlinear Kerr

materials; the optical limiter being a broadband nonlinear optical limiter having a respective separate spatial area for each single channel optical signal, said respective separate spatial area adapted to limit the single channel optical signal to produce a limited single channel optical signal.

Brzozowski et al teaches a nonlinear optical limiter (figure 1); wherein each nonlinear optical limiter is adapted to produce a limited single channel optical signal according to an optical limiting power transfer curve applied to the respective single channel optical signal, said optical limiting power transfer curve providing a piecewise increasing monotonic transmitted power function portion when incident light upon the nonlinear optical limiter has a power less than an incident light critical power, and providing a relatively flat transmitted power function portion when incident light upon the nonlinear optical limiter has a power greater than the incident light critical power, and wherein the limit transmission powers of the nonlinear optical limiters are defined by said relatively flat transmitted power function portion; wherein the piecewise increasing monotonic transmitted power function portion has a steeper transmitted power function portion having a slope of greater than one whereby sides of optical pulses of the respective single channel optical signal are corrected; the piecewise increasing monotonic transmitted power function portion has a transmitted power function portion which limits the power of the respective single channel optical signal to an insignificant transmission power for incident light upon the nonlinear optical limiter having a power less than an incident light power threshold (see figures 2-7), wherein the incident light power threshold is less than said incident light critical power; wherein the nonlinear

optical limiters are Bragg gratings comprising nonlinear Kerr materials; the optical limiter being a broadband nonlinear optical limiter having a respective separate spatial area for each single channel optical signal, said respective separate spatial area adapted to limit the single channel optical signal to produce a limited single channel optical signal (see the entire document).

In view of Brzozowski et al's teachings, it would have been obvious to one of ordinary skill in the art at the time of the invention to include, with the system as taught by Nakabayashi et al, the optical limiter being a nonlinear optical limiter; wherein each nonlinear optical limiter is adapted to produce a limited single channel optical signal according to an optical limiting power transfer curve applied to the respective single channel optical signal, said optical limiting power transfer curve providing a piecewise increasing monotonic transmitted power function portion when incident light upon the nonlinear optical limiter has a power less than an incident light critical power, and providing a relatively flat transmitted power function portion when incident light upon the nonlinear optical limiter has a power greater than the incident light critical power, and wherein the limit transmission powers of the nonlinear optical limiters are defined by said relatively flat transmitted power function portion; wherein the piecewise increasing monotonic transmitted power function portion has a steeper transmitted power function portion having a slope of greater than one whereby sides of optical pulses of the respective single channel optical signal are corrected; the piecewise increasing monotonic transmitted power function portion has a transmitted power function portion which limits the power of the respective single channel optical signal to an insignificant

transmission power for incident light upon the nonlinear optical limiter having a power less than an incident light power threshold, wherein the incident light power threshold is less than said incident light critical power; wherein the nonlinear optical limiters are Bragg gratings comprising nonlinear Kerr materials; the optical limiter being a broadband nonlinear optical limiter having a respective separate spatial area for each single channel optical signal, said respective separate spatial area adapted to limit the single channel optical signal to produce a limited single channel optical signal, in order to provide optical limiters that would maintain key qualitative behavior even with substantial fabrication errors (see the conclusion of Brzozowski et al).

3. Claim 8 is are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakabayashi et al as modified by Brzozowski et al further in view of Hanatani et al (US 5,422,968).

The teachings of Nakabayashi et al as modified by Brzozowski et al have been discussed above.

Nakabayashi et al as modified by Brzozowski et al fails to specifically teach the optical demultiplexer being adapted to amplify the multichannel optical signal.

Hanatani et al teaches an optical demultiplexer (3), wherein the optical demultiplexer is adapted to amplify (via amplifier 34) a multichannel optical signal (input through optical fiber 1) (see figure 1 and column 4 lines 39-49).

In view of Hanatani et al's teachings, it would have been obvious to one of ordinary skill in the art at the time of the invention to include, with the system and method as taught by Nakabayashi et al as modified by Brzozowski et al, the optical

demultiplexer being adapted to amplify the multichannel optical signal, in order to provide an integrated amplifier and demultiplexer, thereby reducing the number of discrete components.

4. Claims 11, 13, 15, 22, 33-35, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakabayashi et al as modified by Brzozowski et al further in view of Lim (US 6,552,844 B2).

The teachings of Nakabayashi et al as modified by Brzozowski et al have been discussed above.

Nakabayashi et al as modified by Brzozowski et al fails to specifically teach an isolator adapted to absorb any power of the single channel optical signals which are reflected from the respective nonlinear optical limiter; wherein the nonlinear optical limiters are absorptive nonlinear optical limiters.

Lim teaches the use of an isolator (16) adapted to absorb any power of an optical signal which is reflected; and an absorptive nonlinear optical limiter (26) (see figure 1, column 2 line 33 - column 3 line 2, and column 3 lines 38-64).

In view of Lim's teachings, it would have been obvious to one of ordinary skill in the art at the time of the invention to include, with the system and method as taught by Nakabayashi et al as modified by Brzozowski et al, an isolator adapted to absorb any power of the single channel optical signals which are reflected from the respective nonlinear optical limiter; wherein the nonlinear optical limiters are absorptive nonlinear optical limiters, in order to prevent unintended backscattering and reflection of light.

Allowable Subject Matter

5. Claims 9, 10, 12, 16, 17, 31, 32, and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, taken alone or in combination, fails to teach or fairly suggest: for each single channel optical signal a respective bias optical signal source providing to the nonlinear optical limiter a respective bias optical signal of a wavelength different from each of the single channel optical signals, each bias optical signal having a power, each limited single channel optical signal having a power which has a dynamic range; wherein the power of each bias optical signal controls the dynamic range of the power of the respective limited single channel optical signal produced by the respective nonlinear optical limiter; in combination with the other claimed limitations.

While Lim and Yamaguchi (US 2001/0022874 A1) both teach the use of a bias power source (a pump source), both Lim and Yamaguchi apply the bias power source to a multiplexed optical signal, not a single channel optical signal as in the present invention. Thus, there is no motivation for one of ordinary skill in the art at the time of the invention to combine the references in a manner so as to create the claimed invention.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamaguchi (US 2001/0022874 A1), Ovadia et al (US

2003/0214703 A1), Kaneko (US 2002/0057875 A1), Golub (US 6,477,293 B1), Nakamura et al (US 6,418,249 B1), Akiba et al (US 6,222,956 B1), Aksyuk et al (US 6,148,124) Ishida (US 5,701,371), Sagan (US 2002/0118915 A1), Maeda et al (US 2003/0223728 A1), Aksyuk et al (US 6,636,657 B1), Nakabayashi et al (EP 1 098 219 A1), and Fukuchi (JP 10-13357 A1) all teach systems and method for processing optical signals.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jared J. Fureman whose telephone number is (571) 272-2391. The examiner can normally be reached on 7:00 am - 4:30 PM M-T, and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael G. Lee can be reached on (571) 272-2398. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

February 7, 2004

Jared J. Fureman

JARED J. FUREMAN
PRIMARY EXAMINER